Physics of drying colloidal suspensions

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The drying of a concentrated suspension is surprisingly complex phenomenon. Drying means that the liquid solvent, often water, evaporates due to the low relative humidity of the environment, which in turn triggers a cascade of complex events such as «coffee» ring formation, drying fronts and cracks propagation, build-up of internal stresses... [1,2] Filmification is a important subcase where deformable polymer particles are brought into contact, interprenetrate and eventually form an homogeneous dried layer. The process is fundamental for inks, paints, plastic coating…, a process known in chemical engineering as latex film formation. When binary mixtures of particles, additional phenomena enters into the picture, such as vertical and lateral population segregation [3,4].

The doctoral project consists in developping a molecular dynamics model of deformable particles that will make it possible to simulate a number of situation of interest : soft and hard particles, small and large particles, etc. Building on existing experimental and numerical results obtained within the ANR funded consortium LatexDry, the model will use the Lammps numerical simulation package, and will aim at reproducing experimental results as well at making new, unexpected predictions [5,6,7].

Key words : Theory, Programming, Statistical Physics, Chemical Physics,

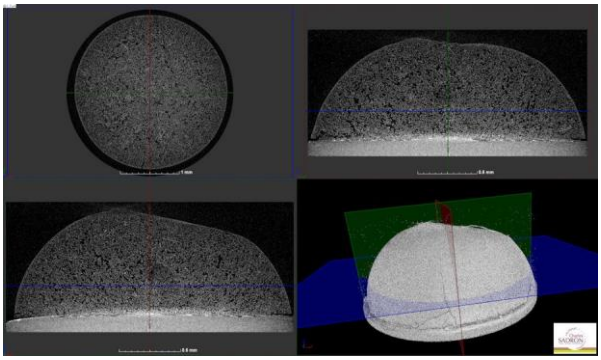

Image par tomographie X d'une goutte sèche de colloïdes, D. Favier, ICS

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